

*Notes on the Weather.*—In San Jose, air pressure, temperature, and relative humidity have been quite close to the normal of the month; rainfall was rather in excess, and the same is also true of sunshine, on account of the predominance of clear skies during the morning hours; four days only were rainless, and a specially heavy shower fell on the 16th; total amount, 56 millimeters, of which 32 millimeters fell in two hours. On the Atlantic slope, rains were less abundant than during the preceding months on the coast belt, rather scarce along the foothills and in the Reventazon Valley, and excessive in the mountains of Sarapiquí and San Carlos.

*Notes on earthquakes.*—August 13, 1:48 p. m., slight tremor, NE-SW; intensity 1; duration, (?)

TABLE 3.—Rainfall at stations in Costa Rica, August, 1901.

Stations.	Amount.	No. rainy days.	Stations.	Amount.	No. rainy days.
	<i>Mm.</i>			<i>Mm.</i>	
1. Sipurlo (Talamanca).....	155	18	14. Juan Vinas.....	118	16
2. Boca Banano.....	253	14	15. Santiago.....	111	17
3. Limon *.....			16. Paraiso.....	218	20
4. Swamp Mouth *.....			17. Las Concavas.....	176	19
5. Zent *.....			18. Cartago.....	163	19
6. Gute Hoffnung.....	133	10	19. Tres Rios.....	290	22
7. Siquirres *.....			20. S. Francisco G.....	367	24
8. Guapiles.....	168	15	21. San Jose.....	342	27
9. Sarapiquí.....	450	26	22. La Verbena.....	313	27
10. San Carlos.....	440	20	23. Nuestro Amo.....	317	22
11. Las Lomas.....	141	7	24. Alajuela.....	318	16
12. Peralta.....	168	15	25. San Isidro Alajuela.....	533	22
13. Turrialba.....					

\*Observations not received.

† July, 401 mm.;—30 days.

## MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Manuel E. Pastrana, Director of the Central Meteorologic-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the Boletín Mensual. An abstract, translated into English measures, is here given, in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means are now reduced to standard gravity.

Mexican data for August, 1901.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	<i>Feet.</i>	<i>Inch.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>%</i>	<i>Inch.</i>		
Chihuahua.....	4,689	25.28	86.0	68.0	74.5	66		.....	.....
Colima.....	1,600	28.23	91.0	67.5	77.5	56	8.43	sw.	.....
Guanajuato.....	6,640	29.71	86.0	51.8	69.4	58	5.58	ene.	.....
Leon (Guanajuato).....	5,906	24.26	84.9	52.9	69.4	61	3.25	se.	.....
Linare (Nuevo Leon).....	1,188	28.61	97.7	68.0	81.9	73	1.97	s.	.....
Mazatlan.....	25	29.62	91.9	74.1	83.5	79	11.86	nw.	e.
Mexico (Obs. Cent.).....	7,473	28.02	77.0	50.9	62.2	69	2.91	nw.	sw.
Monterrey (Sem.).....	1,628	28.12	102.9	69.4	85.1	63	0.75	e.	.....
Morelia (Seminario).....	6,401	28.93	75.2	44.2	63.1	77	6.24	s.	e.
Pachuca.....	795	22.46	73.4	50.0	62.1	72	9.49	ne.	.....
Puebla (Col. Cat.).....	7,125	23.86	75.9	53.6	64.4	73	8.85	ese.	ssw.
Saltillo (Col. S. Juan).....	5,399	24.77	89.6	59.0	72.5	66	11.81	ne.	.....
S. Isidro (Hue de Gto).....			77.4	67.1	.....	.....	6.72	ne.	.....
Toluca.....	8,812	21.94	73.8	33.8	57.9	77	5.54	se.	.....

\*Reduced to standard temperature and gravity.

## THE ISLAND OF PORTO RICO.

By JOSEPH L. CLINE, Observer, U. S. Weather Bureau.

Porto Rico is within the Tropical West Indies, between latitudes 17° 50' and 18° 30' north, and longitudes 65° 30' and 67° 15' west from Greenwich. It lies east of Haiti, being separated from it by Mona Passage, and it is the smallest and easternmost island of the Greater Antilles. It was discovered by Columbus, November 16, 1493, during his second

voyage to the Western Hemisphere. He first sighted Cape Mala Pascua, and then sailed along the south and east coast to Aguada, where he landed November 19, and took possession of the island in the name of the reigning sovereigns of Spain and christened it San Juan Bautista, in honor of Saint John the Baptist, while its Indian name was Borinquen. For fourteen years after its discovery the island remained unexplored. Trading vessels stopped there occasionally, usually for water, but it was not until 1508 that Ponce de Leon made his landing from Santo Domingo and established a form of government other than that of the Indians; he founded the town of Caparra, about three miles inland from the bay of San Juan, in 1509, which was afterward named Puerto Rico, or Rich Gate, and transferred to the present site of San Juan. Subsequently the island and the city exchanged names, and the place where the first town was founded is now known as Pueblo Viejo, or old town. Porto Rico, owing to its location, practically controls the Virgin and Mona passages from the Atlantic Ocean into the Caribbean Sea, thus occupying a strategic position of much importance. Subsequent events show that this fact was recognized at an early date. Thus, in 1597, San Juan was blockaded and captured by Admiral George Clifford, Earl of Cumberland, but an epidemic of yellow fever forced him to give up the island. Two years previous San Juan fell before the assaulting forces of the great English sea rover Sir Francis Drake. These defeats led to the completion of Moro Castle at the entrance of the harbor of San Juan. A Dutch fleet of 17 vessels attacked San Juan in September, 1625; they landed and besieged the city for twenty-eight days, but were finally forced to withdraw with considerable loss. The French attempted a landing in 1625 but were repulsed. Several minor and unsuccessful attempts to capture the island from Spain occurred between 1625 and 1797. From this latter date to the time of the American occupation of the island in 1898, Porto Rico was exempt from outside attack.

The island is roughly rectangular in shape; it is a little over 100 miles in length, with a breadth of about 36 miles, thus containing about 3,600 square miles. Its greatest length is from east to west. The topography is broken by an irregular range of low mountains and hills which traverse the island from east to west, a little to the south of its center, trending northeastward over the eastern portion, and culminating with the peak of El Yunque (The Anvil) near the northeast corner, which overlooks the island with an altitude of 3,609 feet. Elsewhere these mountains are from 2,000 to 3,000 feet high. This range forms the water divide of Porto Rico, and is known in different parts of the island by various names—Cordillera Central, Sierra de Cayey, and in the northeast Sierra de Luquilla. The contour slopes northward and southward from this range of mountains in broad undulations, and is broken with deep ravines and creeks, some of which become unfordable rivers for a few hours after the heavy tropical rains. The largest streams are the Rios Loiza, Bayamon, Morovis, Arecibo, and Blanco, all on the north side of the divide, and some of which are navigable with small boats for a short distance inland. Most of the interior has a steep hilly surface, gradually becoming more level as the coast is approached. The coast land is low and with few good harbors, that of San Juan being the best. The small islands of Vieques and Culebra lay to the eastward of Porto Rico; the Isla Mona is to the west in the Mona Passage, with a few other islets in its neighborhood, and these are all controlled by the same government.

The climate is not so oppressive as one might expect in the Tropics. A cool, very pleasant, and most welcome breeze generally blows across the island, particularly in the afternoon and at night, which adds much to the comfort of the inhabitants. Much cloudy weather prevails, with an occasional fog

in the mountains. San Juan has an annual mean temperature of 78.5°. The warmest weather prevails from June to October, during which period the normal temperature ranges from 80.4° to 81.4°, with the highest in August, but slightly cooler weather prevails in the mountains. The coolest weather occurs in December, January, and February; during these months the normal temperature ranges from 75.2° to 76.5°, with the lowest in February. It is considered cold when the daily temperature ranges from 55° to 65°, and such temperatures are very uncomfortable to the natives. Temperatures of 50° or slightly below have been recorded in the mountainous portions, and it is reported that light frost has been noted on some of the highest points, but no meteorological records report frost. The highest temperature recorded at San Juan during the past two years, or since American occupation, was 93.2° on May 2, 1901, and 93° was recorded April 25, 1900; the lowest was 65°, December 26, 1899. The temperatures at San Juan, the only station mentioning continuous self-registers, range generally from 65° to 89° during January, February, March, November, and December, and from 66° to 93° during the other months of the year.

January, February, and March are the driest months, and during this period the rainfall is less than 3 inches per month. The greatest monthly rainfall occurs in October and November, but the so-called wet season generally commences in April and continues into December. Droughts, very destructive to vegetation, are noted in some years. The average annual rainfall at San Juan is 54.50 inches, while at Hacienda Perla, a station in the northeast part of the island, on El Yunque, it is 133.93 inches. The greatest annual rainfall at San Juan, from a record of twenty-five years, was 82.66 inches in 1878, and the least was 36.64 inches in 1893. The greatest monthly rainfall was 17.66 inches in December 1893, and the least was 0.24 inch in February, 1896.

The forest areas are small and almost entirely confined to the highest mountains, with few scattering remains of the primeval forests. Timber is very scarce, and most of that used in buildings is imported.

More than one-fifth of the island is under cultivation, and crops yield well considering the manner of tillage; the mountains are cultivated, even to the summit. Hoeing for the purpose of freeing the ground of pernicious vegetation is usually performed by cutting away the growth with blows of the machette, a large knife. Improved methods of farming are greatly needed. Much coffee is grown, and growers modify the climate by employing shade for coffee trees. The select and celebrated coffee is produced in regions lying between 200 and 800 meters above sea level. The cultivation of coffee occupies about 41 per cent of the total land under cultivation, sugar cane 15, bananas 14, and the balance is divided among small crops, such as sweet potatoes, indian corn, malangas, rice, tobacco, cocoanuts, okra, lerenes, caseava or yuca, tania, yams, plantains, squashes, watermelons, cantaloupes, cabbage, lettuce, turnips, celery, radishes, beets, caimito, ausuba, May apples, mangos, zapote, nispero, cocoa plum, multa, pajuil, calabrenas, West Indian grapes, breadfruit, indian chestnuts, figs, West Indian nuts, currants, cherries, peanuts, beans, custard apples, heart fruit, guanabana, guava, cucumbers, Mexican fruit, eggplants, tomatoes, pepper, carrots, pineapples, water cresses, gundas, cactus pyaya, papaws, oranges, lemons, limes, cayure, bixa, jagua, barley, strawberries, tamarindos, and cotton. The cotton plant is said to live nine years and grows to be a tree of considerable size, but very little use is made of the fiber. The island abounds in cocoa, indigo, and many medicinal plants, but they are not used to a very great extent.

Transportation is very difficult. The French railway now extends part of the way around the western end of the island, but there are no other railroads except a trolley line connect-

ing the beautiful suburbs at San Turce with San Juan, the capital. Aside from the military wagon road, constructed by the Spanish Government from San Juan to Ponce, there are no roads worthy of name, except those now under construction by the United States Government. Transportation over other routes is by means of pack trains, and the writer spent a few miserable days trying to travel along the mountain range by pack saddle.

The population is mixed blood, white, negro, and Indian, with the whites predominating. The island has 264 inhabitants to the square mile, and the density of population is seven times that of Cuba and twice that of New York State. Spanish is now the acknowledged language, but many speak English; English is being taught in the public schools and in a few more years will be the dominating language. The better classes are well educated, highly civilized, and congenial, but very few of the peons, or laboring class, can read or write. The peons, or at least many of them, live from hand to mouth; some never sat down at a table to eat; sometimes a great many sleep in one room like cattle in a pen, yet they always seem to be happy and contented.

Witchcraft is generally an accepted fact among the lower classes; as much so as was the case among the New England pioneers of the United States two hundred years ago. It does not, however, reach the extremity of superstition that is said to reign in Jamaica, Haiti, and Santo Domingo, nor does it have its professional ministers, save that some persons are believed to possess the evil eye, which is undoubtedly a recognition of hypnotic power. Many charms and amulets are used for warding off sickness and trouble.

San Juan, the capital of Porto Rico, is a quaint, old-fashioned town, presenting the odd architectural type which originated with the conquistadors, and still survives throughout the wide possessions that fell under their conquering standards during the fifteenth and sixteenth centuries. It is a composite of what might be termed the "Medievo-Mayan" style, in which the prevailing modes of the middle ages of the Spanish Peninsula were blended with the massive and severe lines of the ancient Peruvians and Mexicans, with whose pueblos, or villages, the conquerors had become so familiar. It is a method of structure that can not be improved upon where earthquakes and hurricanes may be expected, though Porto Rico has never suffered from either to any great extent, except from a hurricane in 1899. All buildings, except those of the peasant poor, which are made of palms and wild grass, are constructed of thick stones or brick walls, surmounted by huge beams supporting flat roofs of brick or tiling. Until recently the buildings were only one story high, but within the past few years the South American and West Indian cities have become slowly modernized, and three-storied structures may be seen in many of them. All other towns in Porto Rico are constructed after the pattern of San Juan, and the largest building in each is a church centrally located. The streets of San Juan are all paved, mostly with brick, and well lighted with both gas and electricity. The city also has a well-managed clubhouse, public library, water system, gas and electric light plants, ice factory, telephone system, and an electric railway. It has a history—a tragic chapter, lurid with fire, red with blood, pulsating with every form of human misery; a history not surpassed in horror by that of any other place. The sea walls surrounding the city, 50 to 60 feet high and 20 to 30 feet thick, are majestic to behold. These represent ages of work, done by the Indian slaves under lash, but the aborigines that once roamed at will over this picturesque island no longer live to tell the tale. Yet their musical instruments, such as drums of various sizes, made out of the hollow trunks of trees, or the macara and the guicharo, made of the dried fruit of the calabash tree, survive them. These instruments may

yet be said to be the national musical instruments of the island, for they are still used in the dances of the Gibaros. The guicharo, a long calabash shell indented and played upon with a stick, was used at balls in society as an accompaniment to the piano and other modern instruments, and was even adopted by the Spanish military bands when they played the country dances. The writer was once welcomed to the island by a serenade from a party of natives with their crude musical instruments.

#### THE METEOROLOGICAL OBSERVATORY OF SAINT IGNATIUS COLLEGE, CLEVELAND, OHIO.

By JAMES KENEALY, Local Forecast Official, dated Sept. 27, 1901.

In furtherance of the expressed wish of the Chief of the Weather Bureau that due credit be given, as far as practicable, to the various cooperating observers scattered throughout the country, who, in their earnest desire for the advancement of science are unselfishly contributing much of their valuable time, day after day, in a labor of love that inures to the general welfare of the public, I take pleasure in submitting, for publication in THE REVIEW, some interesting facts in the history of an educational institution of this city which, for several years past, has furnished valuable reports to the Bureau.

Saint Ignatius College, Cleveland, Ohio, is an outgrowth of a school which was opened by the Society of Jesus for the reception of day pupils, in September, 1886. It was incorporated under the laws of Ohio on December 29, 1890, with power to confer the ordinary degrees. Five years later the establishment of an observatory was decided upon, as a means of encouraging pupils to pursue investigations in natural science. Between the two kinds of observatories, astronomical and meteorological, the fathers chose the latter, in deference to the wishes of the Reverend Father Odenbach, who felt a strong desire to extend the chain of meteorological observatories then under the direction of the order in the various countries of the globe, and which numbered about twenty, so as to include one in the United States. Thus was established, in 1895, the first meteorological observatory of the Jesuits in this country, and at the present time it is the only one. Among those in other countries, the ones which, perhaps, have attracted the most attention are the Rome Observatory, by reason of the work of the renowned astronomer, Secchi, its director for many years; the Havana Observatory, of which Father Vifas was in charge; and the Manila Observatory in the Philippines. Father Frederick L. Odenbach was appointed director of the Cleveland Observatory, and still retains the position. In his appointment the college made no mistake, for the director, besides being an enthusiastic meteorologist and an accomplished physicist, has shown himself to be an indefatigable worker. From slender means he has succeeded in equipping the observatory with a very complete line of meteorological instruments, including not only those usually found at first-class stations of our Bureau, but also the spectroscope, thermopile, nephoscope, electroscope, a Secchi meteorograph, and a lightning recorder, with a Lodge coherer. "Home made" parts of self-registering attachments to several of the instruments bear evidence of natural ingenuity and mechanical skill on the part of the director or his assistants.

The Secchi meteorograph is an object of great interest to visitors. It stands 9 feet high on its base, and is itself 6 feet high and 3 deep, and weighs 600 pounds. The pendulum alone weighs 50 pounds, and 81 pounds of mercury are required to fill and float the barometer. It gives a continuous record of the pressure, the temperature, the velocity, and direction of the wind, and the beginning of rain. Father

Secchi, who was one of the greatest among the pioneers in meteorology, began his work on this instrument in 1852, and completed it in 1867. The apparatus was then placed on exhibition in Paris, and won for its maker the decoration of the Legion of Honor.<sup>1</sup>

During the few years of its existence the observatory has done a great amount of work along special lines, such as cloud photography and cloud study, observations of the conditions of the air at higher altitudes by means of scientific kite flying, and observations of ground temperature at certain depths. Besides his lectures on the natural sciences as a part of the college course, the director found time last winter to give a series of six lectures of two hours each, on modern meteorology and the work of the United States Weather Bureau, to a large class of the teachers of our public schools, by whom they were appreciated as highly interesting and instructive. By such unselfish labors for the spread of education Father Odenbach is winning deserved popularity among all classes of our citizens.

Daily observations of the temperature of the ground since January, 1897, have been compiled, and the monthly means appear in the catalogue of the college for 1900-1901.

Father Odenbach was born at Rochester, N. Y., in 1857. He attended a parish school for five years, and received two years' instruction at the Rochester Collegiate Institute, preparatory to a course at the Rochester University. He left the University to enter Canisius College, Buffalo, N. Y., from which he was graduated in 1881. At this time he joined the Jesuits and went to Europe, where he continued his studies in mental philosophy, natural science, and mathematics. After his return he taught mathematics at Canisius College, Buffalo, N. Y., for three years. He then went to England for four years' further study, and on his return, in 1893, was appointed professor of physics and chemistry in Saint Ignatius College, Cleveland, Ohio, a position he still holds, together with subsequent assignments as curator of the museum and director of the meteorological observatory.

#### THE TORNADO IN HUDSON COUNTY, N. J., ON AUGUST 24, 1901.

By JOHN H. EADIE, Voluntary Observer, Bayonne, N. J.

The cities of Bayonne, Jersey City, and Hoboken occupy the greater part of Hudson County, adjoining one another, in the order named from southwest to northeast. New York Bay and the southern end of Hudson River bound them on the east and Newark Bay bounds Bayonne and the southern end of Jersey City on the west. Through this section, what appears to have been a true tornado passed on the afternoon of August 24. The weather map for that day showed a receding high off the middle Atlantic coast, another high of quite large extent advancing over the Lake region, and a receding low over the mouth of the St. Lawrence River with an extension down the coast between the two highs. Quite heavy rain had been falling from early morning, with a moderate wind from southeast. Just before 4 p. m. the clouds became heavy and dark along the horizon from west to north and advanced with every indication of a squall from that quarter. A roaring of wind was heard, but not louder than that which often precedes a thunderstorm. The writer was to the southeast of the coming storm, and while no funnel was seen against the dark background, a tornadic wind advanced from Newark Bay and struck Bayonne opposite the foot of Thirty-sixth street, about 500 yards from the writer's home, and traveled in a northeasterly direction about 12 miles, accompanied by

<sup>1</sup> This instrument was purchased by Gen. A. J. Myer and exhibited for many years at the Signal Office in Washington. After having been stored away in the Smithsonian Institution it was transferred to the college in Cleveland.—Ed.